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ABSTRACT

This curricular framework for the subject area section, Industrial Arts for Grades K-8, is one of eight Montgomery County (Maryland) Public Schools (MCPS) Programs of Studies. The Goals of Education adopted by the MCPS Board of Education are provided. A Point of View subsection includes reasons for studying the subject, general outcomes sought, ways in which the area of study is pursued, and relationship to other subject areas. The General Information subsection discusses how the subject fulfills the MCPS Goals of Education, how it is organized for instruction, subject area tests required by county or state, federal and state involvement, and information about fulfillment of graduation requirements. Description of Program, the largest subsection, describes the program and supporting courses and identifies instructional objectives for each. For grades 6-8, it is divided into a List of Courses giving a brief view of subject offerings and Description of Courses giving course title, level, length, code, credit value, and prerequisites. A list of pertinent MCPS instructional guides is appended. (YLB)

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PROGRAM OF STUDIES

INDUSTRIAL ARTS, K-8

U S DEPARTMENT OF HEALTH,
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Department of Instructional Planning and Development
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The Goals of Education

Adopted by the Board of Education — February 12, 1973

The goals of education for the Montgomery County Public Schools are set forth in this statement of public policy to guide the school system in developing, implementing, and improving educational programs for its students. This statement outlines those goals considered by the citizens of the county as most important for the education of their children in public schools and for which the citizens will hold the school system responsible and accountable.

The school system has the primary responsibility for some of these goals. For others, it shares that responsibility with the home and other community institutions.

The extent to which these goals can be realized will depend upon the endorsement by and continuing commitment of the school system staff, students, parents, and the community. With broad endorsement and wide support, the Montgomery County Public Schools will continue its development to serve its students and community in the most effective way possible.

Education is a process that encompasses the total experiences of each individual throughout a lifetime of formal and informal learning. The school program, as a keystone in this process, should provide opportunities and encouragement for students to acquire knowledge, to explore ideas, to ask questions, and to seek answers that will lead to sound and useful conclusions.

The probability of success motivates students to learn. Each school must create a program and maintain a climate in which every student has opportunities for success. Each individual is unique, and the school shall encourage that uniqueness. The school should help the student understand his [/her] values and the values of others.

The school program, while developing the skills of learning, should be based on the study of broad human concerns, flexible enough to deal with changing concerns and at the same time related to the needs, interests, and concerns of each student. The program should offer opportunities for decision-making. It should help the student develop the capacity to learn throughout his [/her] lifetime, to respond to and understand other human beings, and to accept full responsibility for the results of his [/her] actions.

Therefore, the Montgomery County Public Schools dedicates itself to provide the opportunity, encouragement, and guidance to make it possible for every child to attain the following goals of education:

ACADEMIC SKILLS

The fundamental responsibility of the school is to develop programs that enable each child to acquire those skills basic to all learning. The achievement of all other goals depends upon the success of the school in ensuring that each student, according to his [/her] own abilities, attain the following basic skills:

- **Reading:** The ability to read and comprehend written material and relate it to other knowledge
- **Composition:** The ability to write with precision, clarity, and acceptable usage, whether to inform, inspire, or persuade
- **Listening and Speaking:** The ability to listen attentively and with understanding and to speak with confidence and effectiveness, whether from written material or extemporaneously
- **Mathematics:** The ability to perform computations, to solve common problems of mathematics and logic, and to understand the structure of mathematics so it can be a useful tool in daily living
- **Study:** The development of basic study skills so that he [/she] may acquire knowledge efficiently
- **The Arts:** The development of some of the basic disciplines and skills in the performing and creative arts to be used throughout his [/her] life for communication, expression, and enjoyment
- **Observation:** The ability to identify and differentiate elements of the world around him [/her] as they are useful in personal, academic, and artistic pursuits

PHYSICAL DEVELOPMENT

Each person matures physically at a different rate and possesses differing capabilities. The school has the obligation to help each student:

- understand the biological functioning of his [/her] body
- make the best both of physical talents and limitations
- develop good health habits, skills, and interests to maintain his [/her] body in optimum condition throughout his [/her] lifetime

INTELLECTUAL DEVELOPMENT

In addition to acquiring academic skills, each individual should develop his [/her] intellectual capabilities to the fullest extent possible. Therefore, the school will encourage each pupil:

- to think creatively
- to reason logically
- to apply knowledge usefully
- to deal with abstract concepts
- to solve problems

THE INDIVIDUAL AND SOCIETY

Every person must learn to live in a society. The school must help each student develop an understanding of [people] and of how the individual depends upon others and they on him [/her]. This requires that each student gain:

- knowledge of himself [/herself] and the characteristics, needs, and desires he [/she] shares with others
- sensitivity to others and their ideas, and the ability to act responsibly in various situations
- the ability to function productively as a member of a group
- familiarity with the legal, moral, ethical, and cultural heritages of his [/her] and other societies
- knowledge of the various political systems and philosophies of the world

SCIENTIFIC UNDERSTANDING

[We] must exist in the natural world. The school must help each student understand nature's impact on [us] and [our] impact on nature. This requires that each student gain:

- knowledge of natural phenomena and their effect on [people]
- understanding of scientific advances and their part in modern technology
- understanding of the scientific method
- appreciation of the ways in which the application of scientific principles can improve the quality of life while preserving the natural order

AESTHETIC EXPRESSION

[We], to realize [our] full potential, must be able to sense and appreciate beauty in the world around [us], whether created by nature or by [people]. The school must help each student gain:

- knowledge of the nature of the creative performing arts
- experience with a wide variety of art forms
- a perspective for developing his [/her] own aesthetic criteria and tastes
- understanding of the contribution of the arts to human communication

CAREER DEVELOPMENT

Productive and satisfying work enriches [our lives]; and with increasing leisure time, many people will use various occupational skills for avocational purposes as well. The school must help each student gain:

- knowledge and appreciation of the wide variety and interrelationships of occupations in modern society
- opportunities to explore potential occupations in relation to personal aptitudes and interests, unrestricted by stereotypes of sex, race, or socio-economic level
- the knowledge, skills, and abilities that enable him [/her] to secure satisfying employment, embark upon further training and education in a chosen career field, and adapt occupational talents to changing job demands and opportunities

COMMITMENTS

The Board of Education and the staff of the Montgomery County Public Schools must create and maintain an educational environment that promotes the attainment of these goals by all students. Toward this end, therefore, the public schools make the following commitments to the citizens of Montgomery County:

- *To attract and retain the most qualified and best trained staff possible through dynamic programs of recruitment, supervision, and continuing in-service training and staff development opportunities*
- *To develop and implement a comprehensive and flexible instructional program to achieve the aforementioned goals and to provide the facilities, materials, and equipment needed to enhance the effectiveness of the program*
- *To evaluate the effectiveness of the instructional program continuously, and regularly report the findings to students, parents, staff, and the community*
- *To adopt new and different approaches when it is determined that they will contribute more effectively to the fulfillment of the goals*
- *To encourage a continuing dialogue with the entire community, making every effort to communicate needs and achievements, and to be responsive to the needs and aspirations of the school community*
- *To utilize facilities and staff, in cooperation with other agencies, in the development of preschool, community school, and adult education programs that will meet the continuing educational needs of all citizens*
- *To provide an accountability procedure for informing county citizens of the objectives and costs of their school system and of reporting periodically on the educational investments made with their tax dollars*

INDUSTRIAL ARTS, GRADES K-8

POINT OF VIEW

Although many students entering the sixth grade in the middle school or seventh grade in the junior high school have had some experience in using hand tools, it is their first formal learning experience dealing with the safe and proper use of tools. Therefore, the program places emphasis on the proper use of a variety of hand tools. The vehicle by which students develop and achieve skill in the industrial arts is usually the individually-constructed project. However, as students become proficient in using tools, they are also able to perform service and repair work on items in and around the home and the school. The program should provide students with: (1) the opportunity to enrich and integrate their curricular experiences through participating in a variety of activities requiring the use of a wide selection of instructional tools and materials; (2) the opportunity to make learning more effective through utilizing several of the senses in constructing objects relating to the subject to be learned; (3) information and knowledge which enables them to understand the impact of industry and technology upon their lives.

The curriculum draws its content from industry, as a provider of goods and services, and from technology, involving the techniques that have been developed to convert raw materials into consumer products.

The program should include both those activities which can correlate with and enhance the content to be learned from other subjects and those activities which relate to the specific body of content dealing with industry and technology. Students should be involved in those activities which require them to formulate ideas; make simple sketches of items to be constructed; compute costs; select materials; develop and/or follow sequential steps in constructing projects; use tools and machines to cut, shape, fabricate, and protect materials; and to relate these experiences to both careers and self interests. These activities reinforce the learning theory that we learn by doing. Physical, manipulative activities fulfill the learning principle that learning is enhanced through sensory experiences such as seeing, hearing, smelling, feeling, and handling. Such experiences are inherent in industrial arts activities.

As students progress through the middle school years, industrial arts content and activities deal with industrial organizational patterns, career and occupational information, materials, processes, and products as they focus upon both the achievements and problems of an industrial/technical society.

GENERAL INFORMATION

The industrial education program contributes generally to those MCPS Goals of Education* which emphasize the intellectual development and the scientific understandings of each individual. More specifically, it contributes to the fulfillment of that goal dealing with Career Development:

> Productive and satisfying work enriches [our lives]; and with increasing leisure time, many people will use various occupational skills for avocational purposes as well. The school must help each student gain:
>
> . knowledge and appreciation of the wide variety and interrelationships of occupations in modern society
>
> . opportunities to explore potential occupations in relation to personal aptitudes and interests, unrestricted by stereotypes of sex, race, or socioeconomic level

*approved February 12, 1973 by the Board of Education of Montgomery County, Maryland

- the knowledge, skills, and abilities that enable [the student] to secure satisfying employment, embark upon further training and education in a chosen career field, and adapt occupational talents to changing job demands and opportunities

Industrial Education includes those curriculum areas which deal with the occupational, technological, social, and cultural aspects of industry. Specifically, the programs found in the schools include industrial arts courses, trade and industrial courses, technical education courses, and agriculture/horticulture courses.

The program offered in the middle school and in Grades 7, 8, and 9 of the junior high school is industrial arts, which emphasizes the exploratory aspect of career education. The individual courses are organized around

1. content in a cluster of occupational fields; e.g., communications, which includes design and drafting, printing processes, photography, other audio/visual media
2. activities which involve students in the processes (sequence of tool skills) required to plan, develop, and construct projects or to perform services and/or repairs
3. perceived needs or interests of students

Industrial arts courses deal with industrial organizational patterns, occupational information, materials, processes, and products as they focus upon both the achievements and problems of an industrial/technical society. In all industrial arts courses, pupils work in laboratory situations to

1. identify problems
2. plan logical solutions to problems of design and construction
3. use tools and materials properly and safely when constructing projects
4. evaluate consumer products
5. acquire knowledge about job requirements, job opportunities, and educational background needed to advance in the job
6. develop respect for quality workmanship and for the value of all constructive labor
7. pursue recreational and avocational interests

It is recommended that all sixth grade students take the unit Introduction to Industrial Arts. Although this unit is recommended for those sixth grade students who attend a middle school, elementary schools may offer the course if they have an adequate and properly equipped space and a certified teacher. Seventh and eighth grade students should be able to elect as many of the other courses as their schedule will permit during the seventh and eighth grade years.

Although content, activities, and pupil outcomes are organized and shown as discreet courses, some of them can be integrated with the content and activities of other disciplines. An integrated interdisciplinary approach can be achieved through team planning involving the appropriate teachers.

Students in industrial arts courses may be charged for the materials used to construct projects which become their personal property.

Safety instruction is an integral part of *all* instruction in industrial arts.

DESCRIPTION OF PROGRAM

List of Courses

Introduction to Industrial Arts
Environmental Agriculture
Industrial Arts — Communications
Industrial Arts — Construction
Industrial Arts — Crafts
Industrial Arts — General
Industrial Arts — Manufacturing

Description of Courses

Introduction to Industrial Arts — Grade 6

Student activities include working with a variety of tools and materials in order to understand the application of materials and to develop a degree of skill using common tools. At this level, students should be introduced to simple sketches and drawing as a means of communication and clarification. They should have the opportunity to construct many projects, using a variety of materials. Construction also includes information about the world of work and the various career opportunities in the occupational clusters of manufacturing and construction.

Upon completion of Introduction to Industrial Arts — Grade 6, the student should be able to:

- interpret and develop working drawings (sketches) of items to be constructed in the school shop
- follow a construction plan-sheet which includes a sketch of the object to be made, a list of materials to be used, and a sequential list of tool operations to be performed in order to construct the project
- identify, by name, and select common hand tools used to measure, layout, cut, shape, and assemble items from woods, metals, cardboard, and other selected materials
- use common hand tools correctly and safely to fabricate items from wood, metal, and other materials
- describe the relationship of industry and technology
- identify career opportunities in wood- and metal-related industries
- behave in a manner which is acceptable in a school shop setting when selecting and returning tools, working individually, assisting fellow students, contributing as a group member

Environmental Agriculture — Grades 7, 8

5509	1 year	Grade 7
5510	1 year	Grade 8

Environmental Agriculture is an interdisciplinary program designed to provide a laboratory-field-classroom experience focusing on agricultural content and activities which relate to the broad environment. Students are involved in

1. learning about and caring for both farm and domestic animals
2. nurturing and propagating plants and shrubs
3. managing a greenhouse
4. gardening
5. landscape planning
6. engaging in agri-business activities through Future Farmers of America (FFA) clubs

Upon completion of Environmental Agriculture — Grade 7, most students should be able to:

- identify common breeds of animals used in the production of food and fiber
- care for selected domestic and farm animals as far as feeding, health, and housing are concerned
- explore various careers associated with agricultural pursuits
- engage in FFA and school activities dealing with agri-business type enterprises
- develop personal skills in speaking, presenting information, and conducting meetings

Upon completion of Environmental Agriculture — Grade 8, most students should be able to:

- identify various plants and shrubs used in landscaping and floral decorations
- nurture and propagate selected plants and flowers
- layout, plant, and care for vegetable gardens
- continue development of personal skills
- continue to explore various careers associated with agriculture and the environment

Industrial Arts — Communications — Grades 7, 8
7073 1 semester

Industrial Arts — Communications is an exploratory course which provides for experiences with different tools, machines, materials, and processes. The activities of the course are planned to provide each student the opportunity to plan, design, and produce projects which deal with different aspects of communications. The areas to be dealt with in the communications course would include illustrative drafting, letterpress printing, linoleum block printing, offset printing, photography, audio recording, silkscreening, and rubber stamp making. Students will also have the opportunity to explore careers associated with the communications industry.

Upon completion of Industrial Arts — Communications, the student should be able to:

- use drawing tools to design, sketch, and draft illustrative projects
- organize, collect, compile, and present information through the use of audio and visual media
- identify his/her interests and explore his/her abilities relating to careers in the communications and media cluster
- use appropriate machines and tools safely to complete projects
- describe the impact of early technology on the communications cluster
- compare activities performed in class to activities found in the world of work
- behave in a manner which is acceptable in a school shop setting when selecting and returning tools, working individually, assisting fellow students, and contributing as a group member

Industrial Arts — Construction — Grades 7, 8
7074 1 semester

The course is designed to introduce the student to the skills, knowledge, environments, and careers of the construction industry. The students will study the importance of construction to society. They will follow all the steps involved in designing, building, selling, and maintaining structures. Students will mix and place concrete, build a structure, and wire a circuit.

In addition to skills and knowledge, the student will learn how to make decisions and to work with other people. The course will give the student valuable experience in helping identify goals, interests, and abilities as well as identifying personal skill strengths.

Upon completion of Industrial Arts — Construction, the student should be able to:

- identify his/her interest and explore his/her abilities relating to the world of construction
- identify careers in the construction industries
- construct wall, floor, and roof systems; install a basic electrical circuit; lay brick and block; install pipes for water and gas
- work safely and in an orderly manner
- make decisions on job-related tasks
- read and follow construction drawings
- identify elements of community planning which preserve the natural environment and provide for responsible growth
- describe the dependent relationship of the various tradespersons during a construction project

Industrial Arts — Crafts — Grades 7, 8

8051 1 semester

Industrial Arts — Crafts is an enrichment course providing experiences with a variety of materials and tools. Students will study techniques used by industry to produce crafts items. Activities of the course are planned to provide each student the opportunity to design and construct useful objects. The areas taught in the crafts course would include (but are not limited to) wood carving, jewelry making, leather working, plastics, silkscreening, and etching.

Upon completion of Industrial Arts — Crafts, the student should be able to:

- demonstrate skill in designing, sketching, planning, and constructing useful objects
- identify and use common tools used to cut, shape, assemble, and finish hand-crafted objects
- behave in a manner that is acceptable in a school shop setting where student project construction is occurring
- investigate career opportunities within the field of industrial crafts
- identify individual interests and abilities within the crafts areas

Industrial Arts — General — Grades 7, 8

7001	1 semester	Grade 7
7002	1 semester	Grade 8

Industrial Arts — General — Grade 7 and Grade 8 are laboratory courses. Emphasis is placed upon the exploration of *technology* — the tools, materials, processes, products; *science*, as it relates to an industrial/technological society; *economics* — the management of finances associated with producing goods; *social organization* — the industrial personnel system and human relation skills; and *cultural aspects* — the heritage of an industrial society.

Courses are designed to acquaint students with three fundamental tasks and concepts:

1. the development of a positive self-image
2. an understanding of the nature of our industrial/technological society
3. one's place in contributing to that society

Emphasis is also placed on skill development. Students learn how to safely and effectively use both hand- and power-tools. They learn orderly procedures in working with tools, machines, and materials as well as safe working habits. Students learn respect for quality in materials and workmanship and appreciate the value of constructive endeavors. Skills are developed in selecting materials, planning, evaluating, collecting, organizing, and presenting data and ideas.

Upon completion of Industrial Arts — Grade 7, the student should be able to:

- identify the contributions made by technology to the growth of civilization
- work independently in solving problems
- actively engage in inquiring, evaluating, reporting, planning, and communicating
- identify and use a variety of tools and materials when constructing projects
- work safely and in an orderly manner
- display knowledge of career fields in communication and manufacturing

Upon completion of Industrial Arts — Grade 8, the student should be able to:

- explore occupations through role-playing experiences
- participate responsibly in a functioning group; and develop social qualities such as cooperation, tolerance, tact, leadership, and followership
- work safely with and around power equipment
- construct projects utilizing a variety of tools, materials, and processes
- identify some of the problems and contributions created by industrial technology
- work as a team member in pursuing the common goal of producing an item in quantity

Industrial Arts — Manufacturing — Grades 7, 8
7075 1 semester

This program places emphasis on the various methods used to manufacture consumer products. Specifically, content and activities will focus on

1. the organization of people, resources, and capital into an enterprise which manufactures consumer goods
2. processes associated with extracting and refining raw materials into a usable state
3. processes associated with shaping, cutting, and assembling semi-finished materials (wood, metal) into finished products
4. market analysis of a proposed new product

Students organize the class into a corporation; conduct a simulated market analysis for a new product; construct jigs and fixtures with which to fabricate materials; devise a distinct job or operation to perform on the product; produce the product in quantity; and sell or distribute the product to an identified market. Students will also individually experience each step in the manufacturing process by designing and constructing products of their own.

Upon completion of Industrial Arts — Manufacturing, the student should be able to:

- identify, by name and job description, various careers in manufacturing industries
- work harmoniously, as a group member, to design a product, tool up for production, and manufacture a product in quantity
- assume and carry out the responsibilities of management and labor in an industrial organization, producing a product by an assembly-line technique
- describe the importance of interchangeable parts, assembly line technique, flow of materials, and specialization in producing goods and services for society
- construct jobs and fixtures with which to fabricate parts
- use tools and machines safely and properly to lay out, cut, shape, and assemble wood and other semi-finished materials into finished products

- describe the function of the financial, manufacturing, and merchandising divisions of an organization
- sketch and interpret drawings which describe how an item is to be manufactured
- behave in a manner which is acceptable in a school shop setting when working with tools and equipment to construct or manufacture products

MCPS INSTRUCTIONAL GUIDES FOR INDUSTRIAL ARTS

General Industrial Arts, Bulletin 228, 1969.